RECENT RECORDS OF MAMMALS (OTHER THAN BATS) FROM ETHIOPIA

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RECENT RECORDS OF MAMMALS (OTHER THAN BATS) FROM ETHIOPIA

By G. B. CORBET & D. W. YALDEN

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SYNOPSIS

Recent expeditions to Ethiopia collected about 400 mammal specimens for the British Museum (Natural History), and these are identified and discussed. Four species are apparently new to Ethiopia, the shrews *Crocidura niobe* and *Suncus etruscus*, the murid *Arvicanthis somalicus*, and the cane rat *Thryonomys gregorianus*. In addition, there are several species that have been reported from Ethiopia only rarely, including *Tachyoryctes macrocephalus*, *Taterillus emini*, *Lemniscomys striatus*, *Praomys fumatus* and *Proteles cristatus*.

The peculiar zoogeographic relationships of the Ethiopian (i.e. Abyssinian) fauna are discussed in the light of these and previously published records. While an exhaustive examination of the mammalian fauna is not yet possible, it is evident that parallels exist with the better known avian and lepidopteran faunas.

INTRODUCTION

The mammals of Ethiopia are relatively poorly known, and there has never been any comprehensive published account. Many East African species were first described from Ethiopian material, e.g. by Cretzschmar (1826) and Heuglin (1877), but these collections came mainly from the coast of the Red Sea. The main collections from Ethiopia in the British Museum are those made by P. Zaphiro in 1905, especially in

the southern half of the country, and by Major R. E. Cheesman about 1926 to 1932, mainly in the central highlands, but neither of these were reported upon except to describe individual novelties, e.g. by Thomas (1928). De Beaux (1925, 1943) added further records, and recently Ingersol (1968) has collected the mammals of the Harar area. Blower (1968) has given a more general account of the wildlife of Ethiopia.

In 1964 and 1966, adventure training expeditions from the Royal Military Academy, Sandhurst, collected mammals for the British Museum, principally in the region around Lakes Shamo and Abbaya in the Great Rift Valley, south of Addis Ababa (Anon., 1965, 1967). In 1968, the Great Abbai Expedition collected further specimens, particularly along the valley of the Blue Nile (=Great Abbai), and also more widely in central Ethiopia (Anon., 1970; Blashford-Snell, 1970). It is this last collection that forms the main basis for this paper, but relevant information from the other collections is included. D.W.Y. was a member of the Great Abbai Expedition and is responsible for the reports of field observations. G.B.C. identified the collection and supplied the taxonomic notes.

The Chiroptera are not included here, as they have been considered separately by Hill and Morris (1971).

COLLECTING LOCALITIES

Localities in Ethiopia are frequently difficult to trace, sometimes because of changes of name, but also due to the phonetic rendering of native names in different European languages (English, French, German and Italian, at least). The main localities (and alternative names) are therefore given here with geographical co-ordinates, altitude, and the dates of collecting at each. The co-ordinates were taken from the 1 : 100000 scale world maps, series GSGS 4646, sheets NC36, 37 and 38, although in some instances there were apparent discrepancies between these maps and astrofixes taken in 1968. In the absence of a botanist on the expeditions, ecological notes are necessarily vague. Since some of the localities, at least, have been little investigated, it has seemed worthwhile to mention also the sight records of larger mammals.

The 1964 (Royal Military Academy) Expedition

The 1964 Sandhurst expedition collected about 40 mammals from two areas, one in the region of the Rift Valley Lakes, the other further north near Lake Tana.

Soddu, 6° 45'N, 37° 40'E, altitude 1500 m. Collecting here extended from 8–23 August 1964, and was carried out in the area south of Soddu toward the north shore of Lake Abbaya—specimens are referred in the taxonomic list to Soddu, in order to distinguish them from material collected in 1966. This area is in the rift valley and is rather dry, with some cultivated patches but much thick thorn scrub, isolated trees, and some rocky outcrops.

Little Abbai, 11° 20'N, 37° 00'E, altitude 2000 m. Collecting in the valley of the Little Abbai extended from 27th August to 5th September 1964. This area is on the main Ethiopian plateau, between the towns of Danghila and Bahar Dar, and

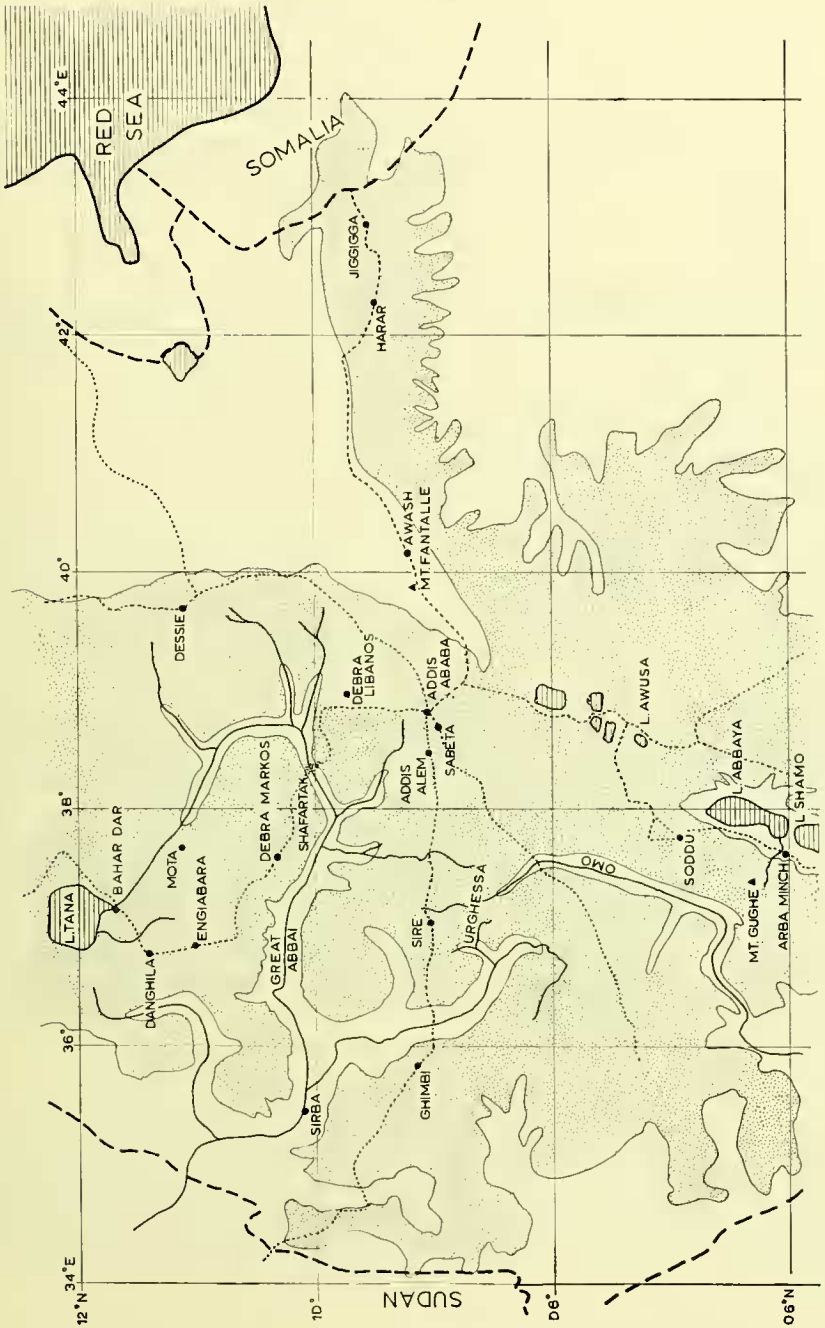

FIG. 1. Map of Ethiopia showing principal collecting localities. Ground over 1500 m is shaded.

south of Lake Tana. With the higher rainfall, rather more of the land is cultivated but there are also patches of scrub and some rocky outcrops.

The 1966 (Royal Military Academy) Expedition

The 1966 Sandhurst expedition collected about 90 mammals under the direction of Dr P. A. Morris from the Rift Valley Lakes region between 6th August and 3rd September 1966.

Lake Abbaya

Base camp was established at the S.W. corner of Lake Abbaya (=L. Margherita) near **Collufu River** at 6° 04′N, 37° 40′E, altitude 1500 m. **Arba Minch**, the provincial capital of Gemu Gofa, is 10 km west of the base camp site. There are small areas of cultivated land, but the dominant vegetation is thorn scrub. At the time of collecting, the area was extremely dry and dusty until the very end of the period when the rainy season began.

Darsi River flows into Lake Abbaya about 12 km north of the base camp. The lake shore region is very swampy, particularly at the mouth of the Darsi, and some collecting was carried out in this region.

Some collecting was also carried out in the **Bonchie** (Bonghe) Valley, 6° 05′N, 37° 20′E, some 35 km west of the base camp, on the lower slopes of **Mount Guġhe**, at about 2700 m. This is an area of riverine forest, with closed canopy, plentiful creepers, and sparse, though lush, ground cover, but with some cultivation.

Lake Shamo

Lake Shamo (=Chamo, Ciamo; also =L. Ruspoli) lies immediately south of Lake Abbaya in the Rift Valley. Some collecting was carried out in an area known colloquially as the 'White Grasses', east of the isthmus between the two lakes, at 5° 58′N, 37° 55′E, at an altitude of 1500 m. This is the area shown on the map by Blower (1968) as the proposed Lake Chand (a misprint for Chamo?) Game Reserve. It is an extensive rolling plain with stony soil and dry, white, grass sharply delimited from the surrounding thorn scrub and hillsides. Sight records here included herds or spot counts of 96 common zebra, *Equus burchelli boehmi*, 16+ waterbuck, *Kobus defassa*, 46+ Grant's gazelle, *Gazella granti*, 104 hartebeest, *Alcelaphus buselaphus swaynei* and 9+ warthog, *Phacochoerus aethiopicus*. The herd of *A.b. swaynei* is believed to be the largest herd known of this race which is on the verge of extinction (Simon, 1968).

The 1968 (Great Abbai) Expedition

This expedition was in the field during August and September 1968. The main object was a navigation of the Blue Nile (Great Abbai) from near its source at Lake Tana to a point near the border of Ethiopia and the Sudan. Most of the zoological collecting was therefore carried out in the Blue Nile Gorge, but specimens were also obtained near the various base camps established on the plateau, and elsewhere in Ethiopia.

The zoological team on the Great Abbai Expedition (Dr P. A. Morris, Dr M. J. Largen, Mr H. King and D.W.Y.) were responsible for most of the collecting including that in the Blue Nile Gorge, at Bahar Dar, Harar, and Awash. Collecting at Ghimbi, and much of that at Debra Markos, was undertaken by other members of the expedition. Most small mammals were collected with various types of break-back trap, of 'rat' and 'mouse' sizes, while a few were caught by hand or killed with dust shot. Larger mammals were shot at night. Hunting was unsuccessful in the Blue Nile Gorge, primarily because of the difficulty of moving about quietly on difficult terrain in the dark, but perhaps also due to a genuine scarcity of larger mammals. Elsewhere, such hunting was most productive. A general account of the progress and organization of the expedition is given by Blashford-Snell (1970), Snailham (1970) and Anon. (1970).

Debra Markos (Debre Markos)

The main base for the expedition was established beside the airfield at Debra Markos, the provincial capital of Gojjam, 10° 20'N, 37° 50'E, altitude 2500 m. Limited collecting was carried out here from 4–27 August 1968. This area is part of the main Ethiopian plateau, and is intensively farmed. Mostly the farmland is pasture for cattle and sheep, but there is also some arable farming. Very little native vegetation remains; the native trees have been replaced by introduced *Eucalyptus* sp., and there are no hedgerows, or even walls, between the fields, which are demarcated instead (if at all) by ditches. The airfield itself carried some low, overgrazed, *Acacia* scrub. No wild ungulates were seen, but spotted hyaenas, *Crocuta crocuta*, were common in and around the town. Two jackals, *Canis aureus*, were seen on the airstrip, and a burrow of aardvark, *Orycteropus afer*, was found. Among the rodents trapped in the area were *Arvicanthis niloticus*, *Lophuromys flavopunctatus*, *Mus mahomet* and *Otomys typus*.

A limited amount of collecting was also carried out along the main road which runs north-west from Debra Markos to Bahar Dar through **Engiabara** and **Danghila** (11° 15'N, 36° 55'E) and southeast to Shafartak Bridge through **Degen** (=Dejem, Gunghi) (10° 10'N, 38° 05'E). The whole of this stretch of road runs along the Ethiopian plateau at around 2500 m, through similar pastoral country.

Blue Nile Gorge

The main collections in the Blue Nile gorge were made during stops on the journey by river from Shafartak road bridge westwards for about 400 km to a point near Sirba. Within this stretch of the river, a series of 'forward bases' (F.B.1, F.B.2, F.B.3) were established and most collecting was done at these, but some specimens were obtained at other, temporary, stops.

Shafartak Bridge (Bridge of Gojjam) 10° 06'N, 38° 17'E, altitude 1150 m.

Guder River, junction with the Blue Nile, 9° 50'N, 37° 41'E, altitude 1000 m. This was the location of Forward Base One (F.B.1), 85 km west of Shafartak. Collections were made from 8–11 August 1968. The gorge in this area, known col-

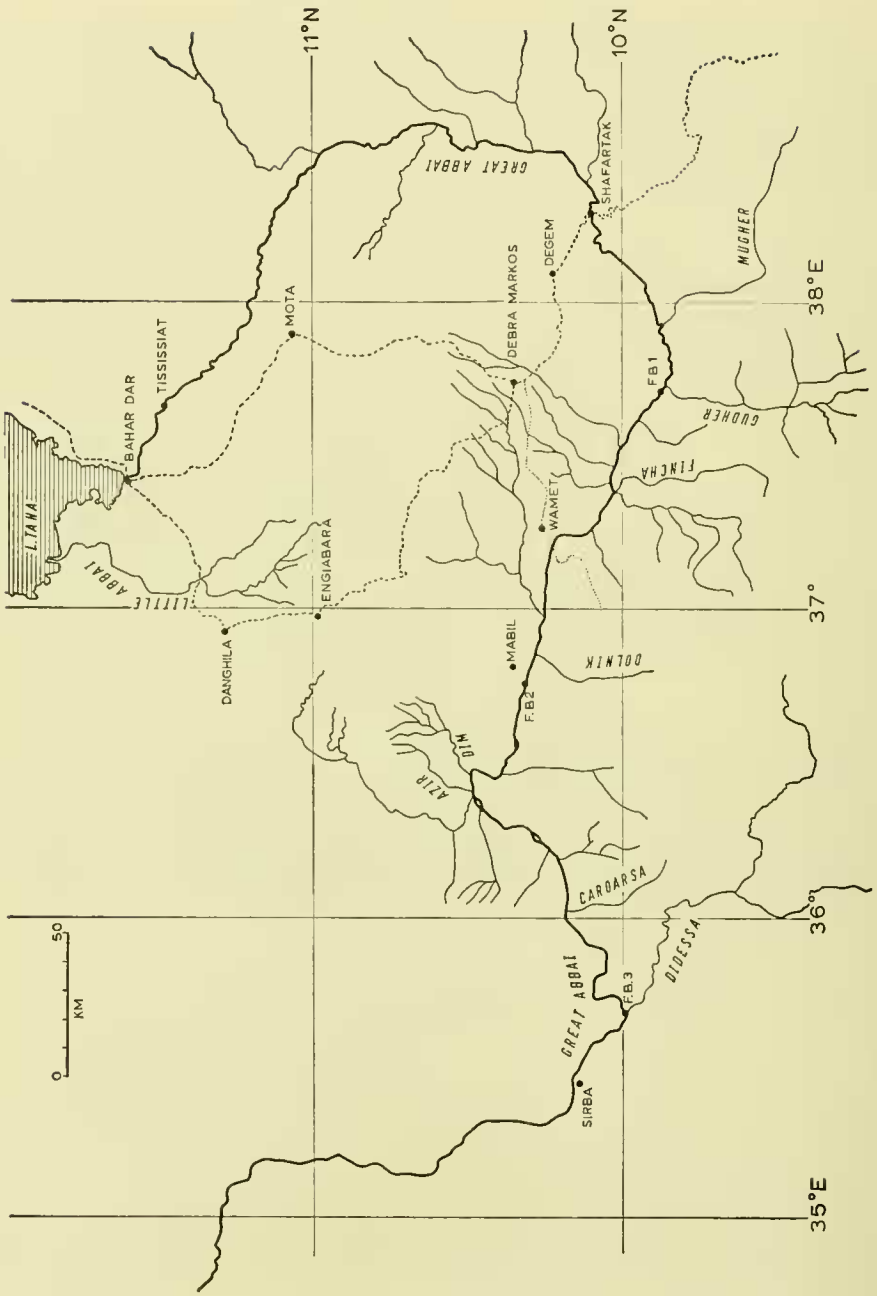

FIG. 2. Map of the Blue Nile showing localities studied during the Great Abbai Expedition.

loquially as the Black Gorge (Blashford-Snell, 1970), is extremely steep-sided, making progress either along or away from the river very difficult. The gorge is entirely uninhabited in this area, except for a Water Resources Board station about 2 km upstream on the Guder (whose flow it monitors). The vegetation consists of a small strip of riverine forest, only one to a few trees wide, and a dry semi-closed thorn scrub away from the rivers and water courses. At the time of collecting, the vegetation was all extremely green, but aerial reconnaissance during the previous dry season revealed a very difficult picture; then, there was only a thin strip of green riverine forest along the rivers, and brown vegetation behind, with the ground cover completely desiccated, and the thorn bushes leafless.

During the journey downstream from Shafartak to F.B.1, a single leopard, *Panthera pardus*, was seen beside the Blue Nile, and troops of olive baboons, *Papio anubis*, were seen, 6 km and 3 km east of the mouth of the Mugher River, 9° 50'N, 37° 55'E. Another troop was reported from the higher ground above F.B.1, and the villagers there also claimed that there was a group of six lions, *Panthera leo*, but this could not be confirmed. Within the gorge, in the immediate neighbourhood of the Forward Base, no trace of larger ungulates or carnivores were seen. Quills of porcupine, *Hystrix cristata*, were found in the area, and at the mouth of the Mugher River. The only small mammals caught were *Acomys* sp. and *Dendromus mystacalis*.

Fincha (=Fingiar) **River**, junction with the Blue Nile 10° 03'N, 37° 20'E, altitude 1000 m. This was a temporary base, where there was some collecting from 11–13 August 1968. The general terrain and vegetation were the same as F.B.1.

In moving from F.B.1 to the Fincha River on 11 August, two klipspringer, *Oreotragus oreotragus*, were seen on the cliffs, and tracks of *Papio anubis* were found on the river bank. A single *Colobus guereza* was seen in the riverside trees about 1 km west of F.B.1, and two warthog, *Phacochoerus aethiopicus*, were seen en route. At the mouth of the Fincha, quills of *Hystrix cristata* were again found, and at least two hyraxes, *Procavia habessinica* were seen. The only small mammal trapped here was the sole dormouse, *Graphiurus murinus*, obtained by the expedition.

Mabil. Forward Base Two was established on the bank of the Blue Nile at 10° 19'N, 36° 45'E, about 8 km S.W. of Mabil village, and 10 km W. of the Dolnik River at 900 m. Collecting here occupied 14–20 August 1968.

Travelling west from the Fincha to F.B.2, on the 14th August, the first 10 km of the journey continued through steep-sided gorge, and a further two klipspringer were seen. These were the last ones seen along the river, however, for further westwards the valley opens out. The vegetation remains essentially the same, with just a thin strip of tall trees and a deciduous thorn scrub hinterland. The valley remains uninhabited, but small patches of cultivated land (mostly with maize) suggest temporary, perhaps seasonal farming. With the river flowing more slowly, hippopotamus, *Hippopotamus amphibius*, were seen for the first time, two east and two west of the Wamet (Uamet) ford at 10° 09'N, 37° 12'E, and at least nine small troops of *Papio anubis*. Another single *Colobus* was noted 1 km west of Wamet.

Sight records at F.B.2 included single specimens of the mongoose, *Ichneumia albicauda* and a male bushbuck, *Tragelaphus scriptus*, while most of the small mammals caught were *Mus* sp., probably *Mus pasha* and *Mus tenellus*.

Azir River. A temporary base was established from 20–22 August 1968 near the Azir River at 10° 29′N, 36° 25′E, altitude 800 m. The Blue Nile from F.B.2 to the Azir River continues through the rather wider valley. A party of *Colobus* was seen at the mouth of the Dim River (10° 30′N, 36° 26′E) and there was another party in the vicinity of the temporary base. There were also small groups of vervet monkeys, *Cercopithecus aethiops*, at both these localities. A single warthog was seen at the base, and tracks were numerous, as were those of hippopotamus. A number of mice, *Praomys natalensis*, were trapped here.

Caroarsa River. A temporary base was established 10 km east of the Caroarsa River, at 10° 07′N, 36° 12′E, altitude 600 m. Collections date from 23–24 August. From the Azir River to some distance west of the Caroarsa, the sides of the Blue Nile Gorge close in to give a steep-sided rocky valley again, known colloquially as the Western Cataracts. However, the river is not so consistently turbulent as in the Black Gorge and a dozen hippopotamus were counted during the journey west to the Caroarsa on 22 August. There was a small party of *Cercopithecus aethiops* in the vicinity of the temporary base, and at least one, perhaps two, *Colobus*. Traces of porcupine and hyrax (?*Procavia habessinica*) were found, while there were tracks of leopard on the river bank. Ungulate tracks, possibly bushbuck, were also noted. Only three rodents were trapped, single specimens each of *Lemniscomys striatus*, *Mus tenellus* and *Acomys ?dimidiatus*. The vegetation at this locality was more lush than elsewhere, a deeper band of riverine forest stretching back for at least 100 m from both banks of the river. As indicative of the added moistness in the area, it was the only site along the Blue Nile from Shafartak westwards where mosquitoes were troublesome.

Didessa River. Forward Base Three was established on an island at the mouth of the Didessa River, 10° 05′N, 35° 38′E, altitude 450 m. Collecting extended from 26–29 August. The island and a thin strip along the river banks constituted a riverine forest, but up the valley sides this gave way as elsewhere to thin scrub. There was a flattish damp area with tall (over 2 m) grass penetrated by the trackways of hippopotamus, and inhabited also by what appeared to be cane rats, *Thryonomys* sp. From the Caroarsa westwards the Blue Nile runs in a widening valley and flows more gently. The first permanent habitations were noted in the Western Cataracts, and the valley became more densely populated, and more intensively cultivated, from there westwards. The nearest village to F.B.3 was about 5 km west, and there were maize fields on the opposite river bank. Small numbers of *Papio anubis*, *Colobus* and hippopotamus were recorded during the journey to the Didessa, and one or two hippopotamus were heard during the nights in the rivers beside F.B.3. A number of *Praomys natalensis* were caught in the native village nearby, while trapping in the river bank vegetation yielded several *Lemniscomys striatus*, *Crocidura ?sericea*, and *Acomys* sp.

Sirba, 10° 05′N, 35° 30′E, marked the western end of the journey downstream. No terrestrial mammals were collected there but four oribi, *Ourebia ourebi*, were seen on the mission airstrip at night on 30th August. The banks of the Blue Nile between the Didessa and Sirba are intensively cultivated, lacking anything more than the odd

remnant tree from the riverine forest, and no large mammals were seen during the last journey down river.

Ghimbi, Wollega Province

Ghimbi, 9° 10'N, 35° 50'E, altitude 2150 m, was a collecting area from 22–31 August 1968. Ghimbi is on the densely populated and intensively cultivated plateau, on the main road west from Addis Ababa. Some collecting was carried out in the town, and in the surrounding maize fields; other specimens came from rough bushland along the main road up to 30 km out of the town. Two specimens came from an area of savannah 24 km north of Ghimbi, at 9° 30'N, 35° 50'E, altitude 1600 m. The main rodents trapped here were *Rattus rattus* and *Lophuromys flavopunctatus*, while among carnivores shot here were *Felis serval, Ichneumia albicauda* and *Viverra civetta*. In addition specimens of *Orycteropus afer, Crocuta crocuta, Colobus guereza, Canis ?aureus* and *Phacochoerus aethiopicus* were reported seen in the area.

Bahar Dar, Gojjam Province

Bahar Dar (Bahr Dar, Bahadar) is located on the main road north from Addis Ababa to Gondar, at the point where it bridges the Blue Nile near the source of the river, 11° 35'N, 37° 25'E, altitude 1830 m. Although on the plateau this area is not so intensively farmed as the environs of Ghimbi and Debra Markos; moreover, there is little arable farming, perhaps because the ground is waterlogged in the wet season, or because the soil is shallow, and instead pastoral farming predominates. Numerous thickets and patches of thorn scrub remain, there is a thin strip of riverine forest along the Nile, and native tree species have not been replaced by the almost ubiquitous *Eucalyptus*. Collecting around Bahar Dar occupied 11–14 September 1968; it was concentrated in an area 15 km south-east of the town, along the road that follows the south bank of the Nile to the Tississiat Falls. Species seen in this area but not collected include *Cercopithecus aethiops, Papio anubis, Felis serval, Genetta* sp. and *Tragelaphus scriptus*. The principal rodent trapped was *Lophuromys flavopunctatus*, and specimens of the rodents *Praomys albipes, P. natalensis, Dasymys incomptus* and three species of crocidurine shrew were obtained.

Harar, Harar Province

Harar itself is on the high ridge that runs eastwards from the eastern wall of the rift valley, but collecting was carried out on the lower ground further east, along the road to Jiggigga. This area is rather sparsely populated, and is mostly very thin thorn scrub with little or no ground cover; some parts are very dry and rocky.

Bisidima River, 9° 15'N, 42° 12'E, altitude 1500 m. This locality was collected 20–21 September. There is some cultivation of maize, and collecting areas included the *Opuntia* hedges around these fields and rough thorn scrub. Trapping yielded specimens of *Rattus rattus, Praomys natalensis, Lophuromys flavopunctatus* and *Crocidura doriana.*

Valley of the Rocks, 9° 15'N, 42° 20'E, altitude 1300 m. An area of sparse *Acacia* woodland, with many boulders, cliffs and scree slopes, collected 21 September. Two klipspringer, *Oreotragus oreotragus*, were seen here, and *Procavia* was collected.

60 km East of Harar, 9° 14'N, 42° 32'E, altitude 1200 m. This is a sparsely inhabited area of thin *Acacia* scrub and very little ground cover, which was studied 21–22 September. Among mammals seen in this area were *Felis silvestris*, *Canis ?aureus*, *Ichneumia albicauda*, and a large troop of sacred baboons, *Papio hamadryas*. The only small mammals caught here were a gerbil *Taterillus ?emini* and a rat *Praomys fumatus*.

Awash, Shoa Province

Awash (=Auasc, Aouche) is well known as a National Park. It lies in the Great Rift Valley in an extension northwards of the more familiar East African *Acacia* savanna, mostly grass with scattered trees and bushes. There is a strip of riverine forest along the Awash River. The area is still moderately active volcanically, with recent lava flows and lava bubble caves, and is dominated by the quiet cone of Mount Fantalle which rises to 2000 m.

The lava bubble caves are of particular importance in the present context. Some of the lava bubbles have opened at the sides, to give normal caves which were used by bats and porcupines; others have collapsed in the top to form pitfall traps, and two of these, at 8° 56'N, 39° 57'E, yielded more than a hundred skulls of various animals.

Most collecting was carried out on the north bank of the Awash River at 8° 50'N, 40° 01'E, and a few specimens came from the area of the hot springs at Filhoa, 9° 00'N, 39° 58'E. Collecting lasted from 23–28 September 1968.

Naturally, in such a rich area for game sight records of many species were obtained. The principal ungulates were oryx, *Oryx gazella beisa*, and Soemmerring's gazelle, *Gazella soemmerringi*. Smaller numbers of waterbuck, *Kobus defassa*, lesser kudu, *Tragelaphus imberbis*, greater kudu, *T. strepsiceros*, and warthog, *Phacochoerus aethiopicus*, were seen, together with three gerenuk, *Litocranius walleri*. An aardvark was killed on the road in the Park; two leopards and two lions were seen, and a single hippopotamus occasionally wandered through the camp at night. A small troop of *Papio anubis* was seen frequenting the riverine forest along the Awash River, and small numbers of *P. hamadryas* were seen in the drier hinterland of the Park. A single zorilla, *Ictonyx striatus*, seen at night was the first record of that species in the locality. The principal small mammals caught were the gerbils *Taterillus ?emini*, *Gerbillus ?harwoodi* and *Tatera robusta*, spiny mice, *Acomys dimidiatus mullah*, and the shrew *Crocidura ?sericea*.

Wellcome Parasitology Unit

In addition to these collections, a number of specimens recently collected by the Wellcome Parasitology Unit based in Addis Ababa have been included. These came from the following localities.

Dessie (Dese), Welu Province, 10° 08'N, 39° 43'E, altitude 2700 m.

Sabeta, Shoa Province, 8° 55'N, 38° 40'E, altitude 2500 m.
Addis Alem, Shoa Province, 9° 03'N, 38° 25'E, altitude 2400 m.

SYSTEMATIC LIST

The taxonomy of most groups of the smaller mammals of Africa is in a very provisional state, especially at the level of delimiting the species. These problems can be solved only by comprehensive revision of each genus on a continental scale, which is out of place in a regional list such as this.

The following list is based primarily upon the collection made by the Great Abbai Expedition in 1968, but it also includes mention of all specimens collected by the expeditions from the Royal Military Academy in 1964 and 1966 and some other Ethiopian specimens recently received at the British Museum.

Identification has been attempted at the subspecific level only where the subspecies seem clearly defined or, more often, where the specimens can be confidently allocated to a form named from Ethiopia whose specific relationship is doubtful.

Order INSECTIVORA

Family **MACROSCELIDIDAE**—Elephant shrews

Elephantulus rufescens (Peters)

Lake Abbaya: one collected at Cullufu River, between Lake Abbaya and Lake Chamo.

This represents the north-western extremity of the range of *E. rufescens*, which is otherwise known in Ethiopia only from the southern border (Mega, Farda Robo, Murri) and from the Harar district, and extends south in the drier, short-grass steppes to Tanzania (Corbet & Hanks, 1968). This specimen differs from all other forms of *E. rufescens* in being very grey, with the mid-dorsal line very dark and the post-ocular spots and upper surface of tail almost black.

Family **SORICIDAE**—Shrews

Suncus etruscus (Savi)

Bahar Dar: one caught by hand under a stone in wet grassland.

This appears to be the first record of this minute shrew (or any pygmy *Suncus*) from Ethiopia. It is an adult male with the following dimensions: head and body 49 mm; tail 29 mm; hind feet 7 mm; condylo-incisive length 12·6 mm (13·2–13·7 mm in sample of 13 other *S. etruscus*); upper tooth row 5·3 mm (5·3—5·8 mm in 20 others); width across M^2—M^2 3·4 mm (3·6–4·0 mm in 22 others). It resembles the Mediterranean *S. etruscus*, and differs from the East African *S. infinitesimus* (Heller), in having the braincase exceedingly flat, with a depth of only 2·4 mm at the basisphenoid.

The only other records of *S. etruscus* from south of the Sahara appear to be one from northern Nigeria in the British Museum collection, reported by Morrison-Scott (1946), and one from Guinea (Heim de Balsac & Lamotte, 1957). The Nigerian

skull also has a short tooth-row (5·3 mm), but the rostrum is wider (M^2–M^2 3·8 mm) and the length of the skull is not determinable. The Ethiopian and Nigerian specimens differ from most available specimens from the main part of the species' range around the Mediterranean in the large size of the fourth unicuspid teeth and the lack of a concavity on the anterior margin of the large upper premolar, but both have the very flat skull of *S. etruscus*, and there seem to be no grounds for the view of Petter & Chippaux (1962) that the Nigerian one should be referred to *S. infinitesimus*.

Crocidura doriana Dobson

Bahar Dar: two trapped in thicket in wet grassland.
Debra Markos: two trapped in grazed *Acacia* scrub.
Harar: one from Bisidima River.
Awash: several skulls from the lava caves.

The two from Debra Markos are very large, exceeding any other specimens from Ethiopia available in the collection of the British Museum: upper tooth-rows 14·7 and 14·8 mm, condylobasal lengths 32·2 and 32·4 mm. The maxima for other Ethiopian skulls are 14·2 mm (n = 17) and 31·8 mm (n = 11) respectively, and Osgood (1936) gave 13·8 mm as the maximum length of upper tooth-row in 28 skulls from Ethiopia.

It is probable that this form should be treated as a race of *C. occidentalis* (Pucheron) or, with *occidentalis*, as a race of *C. flavescens* (I. Geoffroy).

Crocidura cf. *sericea* Sundevall

Awash: eight collected, possibly of this species; a further 42 damaged skulls were collected from the lava caves.

Blue Nile Gorge: two from the mouth of the Didessa River.

These are medium-sized shrews with a pale grey ventral pelage. Measurements of upper tooth-row of all the Awash skulls, totalling 49, give a unimodal distribution with a mean length of 9·02 mm (S.D. ± 0·37, range 8·0–10·1). These all show good agreement with specimens from Sudan that have been named *C. sericea*, and with the types of *C. hindei* Thomas (Kenya) and *C. h. marrensis* Thomas & Hinton (Jebel Marra, Sudan). Setzer (1956) allocated larger specimens from central Sudan to *C. s. sericea* and treated the smaller *marrensis* and *C. lutrella* Heller (from Lado Enclave) as races. The Ethiopian specimens agree more closely in size with *lutrella* and *marrensis* than with the specimens allocated by Setzer to *C. s. sericea* which had upper tooth-rows of 10·3 and 10·6 mm.

Crocidura niobe Thomas

Ilubabor Province: one collected by Drs Largen, Morris and Yalden east of Abiu (west of Gore), at 1500 m in forest in January 1971.

This species of shrew was apparently known only from the east side of Ruwenzori, Uganda between 2000 and 2500 m (Thomas, 1906), although it is possible that other

forms from the Congo and from West Africa may be conspecific. This locality is on the south-western edge of the Ethiopian plateau.

It is very dark greyish brown above and below, and the feet and tail are also dark. The tail is extremely slender, about 80% of the length of head and body, and has very sparse vibrissae on the proximal half only. Measurements are: head and body 70; tail 55; hind feet (without claws) 12; ear 9; condylobasal length 19·5; upper tooth-row 8·9.

Crocidura bicolor Bocage

Little Abbai: one collected.

Bahar Dar: one caught under a stone in wet grassland with thickets.

This is a small shrew with very dark greyish brown dorsal pelage and moderately dark grey ventral pelage. There is a further specimen in the British Museum from '140 miles S. of Addis Ababa' and Osgood (1936) recorded specimens (as *C. b. nana* Dobson) from Hadama on the Awash River and from Addis Ababa.

Order PRIMATES

Family **LORISIDAE**

Galago senegalensis E. Geoffroy—Lesser bush-baby

Ghimbi: one collected 5 km east of the town on the edge of cultivation.

Lake Chamo: two collected on north side of lake.

Family **CERCOPITHECIDAE**

Cercopithecus aethiops (L.)—Vervet monkey

Soddu: three collected.

Little Abbai: one collected.

Lake Abbaya: eight collected.

Blue Nile Gorge: small parties of six to eight seen at the Azir, Dim and Caroarsa river mouths, in or near riverine forest.

Bahar Dar: a party of about six seen in riverine forest.

Colobus guereza Rüppell—Black and white colobus

Soddu: one collected.

Little Abbai: one collected.

Blue Nile Gorge: fairly widespread, with sightings from practically the whole length of the river from the Guder westwards to the Didessa, involving about 20 animals altogether.

Papio anubis (Fischer)—Olive baboon

Lake Abbaya: one collected near Soddu, and two from Arba Minch.

Blue Nile Gorge: seen along the whole length of the river, except perhaps in the Black Gorge, in groups of up to 20.

Bahar Dar: a troop of nine seen on two occasions beside the road to Tississiat.

Awash: a small troop seen in the gallery forest along the Awash River, and reported to raid the camp site occasionally.

Papio hamadryas (L.)—Sacred baboon

Harar: a troop of about 120 seen crossing the Jiggigga road about 60 km east of Harar.

Awash: a small troop on the lower northern slopes of Mount Fantalle.

The ecological and ethological relationship between *P. hamadryas* and *P. anubis* in the Awash area has been studied by Kummer et al. (1970) who reported a zone of hybridization about 15–20 km wide. This, however, is narrow in relation to the mobility of these animals and suggests a considerable degree of reproductive isolation that justifies the retention of species rank for these two forms. There is an ecological separation of the two species, with *P. hamadryas* in the drier regions away from the river. Kummer (1968) has suggested that the juxtaposition of the two species is fairly recent, due to an eastward extension of the range of *P. anubis*.

Theropithecus gelada (Rüppell)—Gelada baboon

Debra Libanos, Shoa: the small colony here is a well known tourist attraction, and lives on cliff-tops not far from the main road north from Addis Ababa. These animals were seen on several occasions, but were the only ones observed.

Order LAGOMORPHA

Family **LEPORIDAE**

Lepus habessinicus Hemprich & Ehrenberg—Abyssinian hare

Harar: ♀ collected at Bisidima River; ♂ and ♀ collected 60 km east of Harar on Jiggigga Road.

Awash: ♂ and ♀ collected.

Lake Abbaya: ♀ collected near Soddu northwest of lake.

These specimens agree with *L. habessinicus* as recognized by Petter (1963), rather than his *L. capensis starcki*, in having only narrow margins of black outside the tips of the ears and in having deep, cement-filled grooves in the upper incisors. This species is closely related to *L. capensis*, if indeed it is distinct at all, and it differs from *L. whytei* (below) in the very soft pelage, longer ears, black and white tail and in having the anterior faces of the upper incisors in the same (transverse) plane.

Lepus ?whytei fagani Thomas—Bush hare

Bahar Dar: four collected in wet grassland with scattered thickets (two of them pregnant with one and two foetuses).

Ghimbi: three collected in bush country close to cultivation.

These specimens agree closely with the type of *fagani* (from Lake Tana). This form was at first allocated to '*L. crawshayi*' by Petter (1959) but later to *L. habessinicus* (Petter, 1963, 1967). The type of *fagani* seems clearly referable to the East African group commonly called *L. crawshayi* rather than to the *capensis* group to which *habessinicus* belongs; it and the specimens in the present collection have harsher pelage, brown on the sides of the tail, short ears, and upper incisors with oblique anterior faces.

However, the type of *crawshayi* de Winton (from central Kenya) seems to belong to the *capensis* group, and the earliest name for what Petter called *L. crawshayi* is probably *L. whytei* Thomas, 1894 from Malawi. Throughout East Africa *L. whytei* seems to be the short-eared, harsh-furred bush hare, whilst *L. capensis* is the long-eared, soft-furred species of the more open plains. All the present specimens of *L. habessinicus* are from the lower, drier areas in the south and east while the *L. ?whytei* all came from the plateau.

Order RODENTIA

Family **SCIURIDAE**—Squirrels

Heliosciurus gambianus multicolor (Rüppell)—Sun squirrel

Blue Nile Gorge: one collected at Mabil.

This squirrel seems identical to a large series in the British Museum from the upper part of the Blue Nile just below Lake Tana, whence it has also been reported by de Beaux (1925). These are lighter than two from Kaffa, presumably referable to *H. g. kaffensis* Neumann. The species does not appear to have been recorded on the Sudanese part of the Blue Nile.

Xerus erythropus leucoumbrinus (Rüppell)—Striped ground squirrel

Lake Abbaya: two from Soddu; one from Arba Minch.

Lake Chamo: one from northwest of the lake.

These localities are probably close to the northeastern limit of this species, the unstriped *X. rutilus* alone being found in the more eastern parts of the country.

Xerus rutilus (Cretzschmar)—Unstriped ground squirrel

Harar: Valley of the Rocks, 40 km east of Harar. At least three unstriped ground squirrels were seen in a rocky area of open *Acacia* woodland. They are presumably referable to this species, which was recorded from this area by Ingersol (1968).

Family **CRICETIDAE**

Subfamily **GERBILLINAE**—Gerbils

Gerbillus (Dipodillus) ?harwoodi Thomas

Awash: seven trapped in various parts of the region; a number of cranial fragments, probably of this same species, were found in each of the lava caves examined.

These small gerbils show good agreement with the type of *harwoodi* (from Naivasha, Kenya), but this must be treated as provisional pending a much-needed revision of this group.

Tatera robusta (Cretzschmar)

Awash: one trapped on north bank of river; a large number of skulls, probably of this species, from the two lava caves.

The greyish dorsal pelage of the only available skin gives this gerbil a closer resemblance to Sudanese *T. r. robusta* than to the more yellowish Somalian forms such as *shoana* and *phillipsi*. Setzer (1956) used the subspecific name *taylori* Hatt (Red Sea coast) for this species in eastern Sudan, but the skin from Awash differs from *taylori* and resembles *robusta* in having the dorsal hair of the tail black rather than brown.

Tatera valida soror Allen

Blue Nile Gorge: one from 10 km west of Mabil; one from the mouth of the Didessa River; mandibles, probably of the same species, from a cave at the mouth of the Guder River.

These agree well with the description of *soror*, from Fazogli on the Sudanese Blue Nile, which was allocated to *T. valida* by Davies (1968), although this must be considered tentative.

Taterillus ?emini (Thomas)

Harar: one from 60 km east of Harar on the Jiggigga road.

Awash: two from the north bank of the Awash River.

Both of these gerbils were in very dry, open *Acacia* scrub, the one at Harar close to maize cultivation, those at Awash close to riverside woodland.

There are no previous examples of this genus from Ethiopia in the British Museum except for the much smaller *T. harringtoni* from the Kenya border near Lake Rudolph. The specimens from Harar and Awash are richly coloured, with almost no grey showing in the pelage. They resemble *T. emini* from Sudan and Uganda in size, but differ in the posterior palatal vacuities which are unusually short for any *Taterillus*. Measurements are as follows (Harar followed by Awash): head and body 117, 119; tail (from pelvis) 127, 167; hind foot (without claw) 31, 32; ear 19, 16; condylobasal length 31·1, 33·7; upper molar row 4·9, 4·8; posterior palatal vacuities 3·0. 3·1.

Family **MURIDAE**

Genus ***ACOMYS***—Spiny mice

Acomys ?cahirinus (Desmarest)

Blue Nile Gorge: two from mouth of Guder River, trapped on a rocky hillside in thick bush.

Lake Abbaya: one from N.E. of Lake Chamo.

See remarks under *A. ?dimidiatus* below.

Acomys ?dimidiatus (Cretzschmar)

Blue Nile Gorge: one 10 km east of Caroarsa River, in riverine forest; three at mouth of Didessa River, in riverine forest and long grass.

Awash: four trapped in dry open *Acacia* scrub close to riverine woodland; remains of two animals from one of the lava caves.

The taxonomy of the spiny mice of the genus *Acomys* in this region is very provisional. The Awash animals agree very closely with the type of *mullah* Thomas from Harar, which Setzer (1968) referred to *A. dimidiatus*. These have large skulls, the only one with moderately worn teeth having a condylobasal length of 28·2 mm and with upper tooth-rows of 4·5, 4·5 and 4·6 mm.

The *Acomys* from the Blue Nile appear to fall into two groups. Two from the mouth of the Guder River are smaller, with upper molar rows of 4·1 and 4·3 mm and condylobasal lengths of 25·8 and 25·5 mm (both are adults with well worn teeth). The remaining four (Caroarsa and Didessa Rivers) have upper molar rows of 4·6, 4·8, 4·8 and 4·9 mm and the two with worn teeth have condylobasal lengths of 27·7 and 28·4 mm. Skins of these two groups are not distinguishable. The difference in size strongly suggests the presence of two species, but in the absence of both at the same locality and in more adequate numbers this cannot be considered certain. The smaller one is tentatively referred to *A. cahirinus* and agrees well, in size and in colour, with *A.c. cineraceus* Fitzinger & Heuglin from eastern Sudan to which Setzer (1956) referred animals from the Sudanese Blue Nile. If Setzer (1968) was correct in allocating *mullah* from Harar to a larger species, *A. dimidiatus*, widely sympatric with *A. cahirinus*, then the four larger animals from the Blue Nile may represent *A. dimidiatus*, but this must be considered very provisional until these two species can be more adequately delimited.

The single animal from Lake Chamo has a very greyish pelage and a small skull (upper molar row 4·3 mm, condylobasal length 25·0 mm) and is likely to represent *A. cahirinus*.

Genus *ARVICANTHIS*—Grass rats

Arvicanthis niloticus abyssinicus (Rüppell)

Debra Markos: four trapped in low, grazed *Acacia* scrub. The single female was pregnant (four embryos).

Dessie: ten from 18 km N.W. of Dessie, trapped on a rocky bank beside a marsh at 2700 m (from Wellcome Parasitology Unit no. 2).

Addis Alem: one collected by Dr Aklelu Lemma.

The animals from Debra Markos could be referred to *fluvicinctus* Osgood, but this is unlikely to be separable from *abyssinicus*. It was based entirely on the longer upper molar row of animals from west of the Blue Nile and the present series from Debra Markos and Dessie, on either side of the Blue Nile, show considerable overlap in this character. The specimens from Debra Markos are, however, distinguished from the Dessie series by an overall suffusion of yellowish brown whereas the Dessie animals are almost pure grey.

These are all dark-bellied animals and most have a distinct narrow mid-dorsal stripe. Other Ethiopian forms that are probably conspecific are *blicki* Frick (S. Chilalo Mts), and *saturatus* Dollman (Guma, Didessa River).

Arvicanthis lacernatus (Rüppell)

Harar: one from the Bisidima River, trapped in grazed thorn scrub.

Dessie: seven from 31 km N.W. of Dessie, trapped in a dry river valley at 2000 m (from Wellcome Parasitology Unit no. 2).

Lake Abbaya: seven from Arba Minch, S.W. of lake.

Awash: parts of ten skulls of a large *Arvicanthis*, probably this species, from one of the lava caves. One skin and skull, of an animal trapped in the National Park, received on loan from the park museum.

There seems to be good reason to recognize two species of large *Arvicanthis* in Ethiopia and in adjacent regions of Sudan, Uganda and Kenya, although much remains to be done to assess their variability. The present species has the underparts grey, rather sharply demarcated from the brown of the flanks. The grey of the belly may be quite dark, as in the series from the Dessie region, or may be suffused with brown in the midline as in the animal from Harar, but it is never speckled like the dorsal pelage as it is in most *A. niloticus*. *A. lacernatus* lacks a clearly defined dorsal stripe, and there is a tendency for the rump and hind legs to be unspeckled and tinged with orange brown. These characteristics are seen in fairly extreme form in the specimen from Harar; in the series from Lake Abbaya the brown on the rump is less distinct whilst in the series from Dessie it is absent altogether and the ventral pelage is a uniform dark grey. The brown colour on the rump in this species is very evenly distributed and seems quite distinct from the sporadic erythrism that seems to be a characteristic of *A. niloticus*. The specimen of *A. niloticus* from Addis Alem, for example, has on the belly a large irregular patch of hair with the basal parts chocolate brown instead of the usual slaty grey, and the tips yellowish brown instead of pale cream.

The specimen from Harar agrees very closely with the type of *pelliceus* Thomas (from Lake Tana) which Osgood (1936) maintained was a synonym of *lacernatus*. Other Ethiopian forms that are probably conspecific are *zaphiri* Dollman (Guma, Didessa River), *mearnsi* Frick (Awash) and perhaps *raffertyi* Frick (Gardula). It is possible that another synonym this species is *Isomys testicularis* Sundevall, 1843 from Bahr-el-Abiad, Sudan.

There is no evidence amongst the present collection of the two species being strictly sympatric in Ethiopia, but de Beaux (1930) recorded both from a single locality in Eritrea, and Heller (1911) described both species from Rhino Camp, N.W. Uganda (as *A. jebelae* and *A. rubescens*).

Arvicanthis somalicus Thomas

Awash: parts of 69 skulls from the lava caves; one animal shot by day in dry *Acacia* scrub, but only the skull preserved; six animals subsequently trapped by

D.W.Y. in December 1970 at Metahara, in heavily grazed grassland with patches of *Acacia* scrub.

This species, described from northern Somalia, does not appear to have been recorded hitherto in Ethiopia. Allen (1939) listed it as a distinct species, with *chanleri* and *reptans* from northern Kenya as races, but Misonne (1968) recognized only one species of *Arvicanthis*, presumably considering *somalicus* to be no more than subspecifically distinct from *A. niloticus*.

The skulls from the Awash caves were the first indication of two sympatric species differing in size (fig. 3), and agreeing respectively with specimens of *A. somalicus*

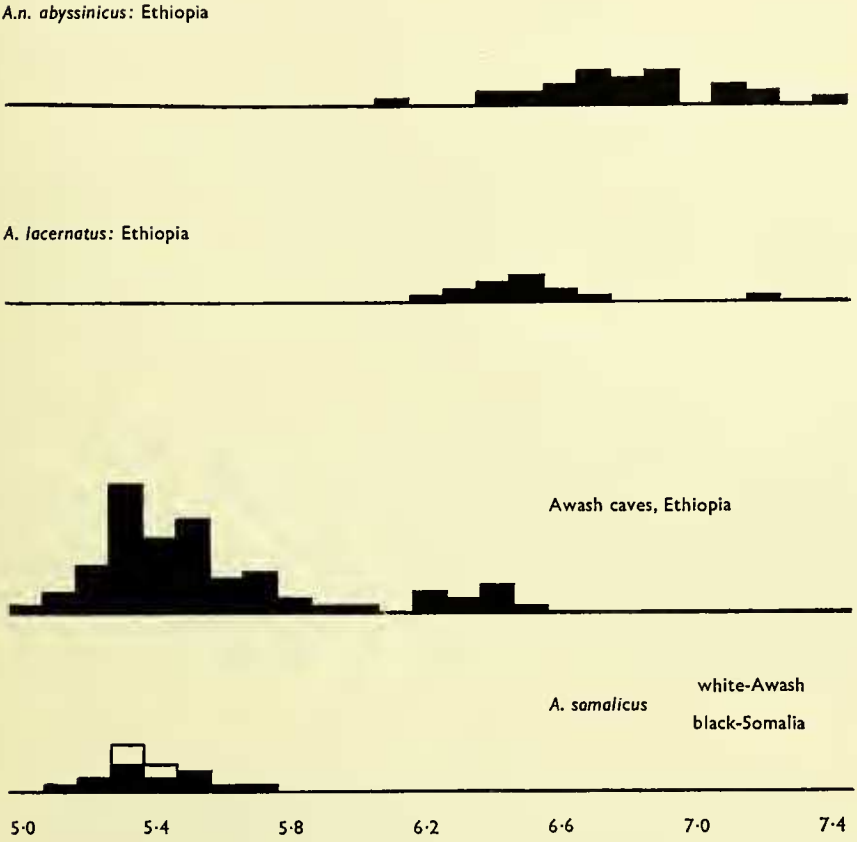

FIG. 3. Length of upper molar row (at maximum of crown) of *Arvicanthis* spp.

from Somalia and of *A. lacernatus* from elsewhere in Ethiopia. This was confirmed by the trapping of six specimens of *A. somalicus* nearby at Metahara in 1970.

These specimens agree very closely with *A. somalicus* from Somalia, including the type, except that the pelage is less yellow. The difference in size, especially of the tooth-row, is sufficiently clear to leave no doubt that there is sympatry of two species at Awash. (Besides the large skulls in the cave sample, we have subsequently seen a specimen of *A. lacernatus* trapped at Awash, which had a tooth-row of 6·3 mm.)

A. somalicus can therefore be considered specifically distinct from *A. niloticus* and *A. lacernatus*, and this record extends its known range by about 400 km westwards from the nearest localities in northwestern Somalia represented by specimens in the British Museum (around Hargeisa). The types of *chanleri* Dollman and *reptans* Dollman, both from the Northern Uasso Nyiro district of Kenya, also fall well within the range of these Ethiopian specimens, with molar rows of 5·6 and 5·5 mm respectively, but considerably more work needs to be done to establish to what extent these small forms are sympatric with larger ones in Kenya.

Externally *A. somalicus* and *A. lacernatus* are very similar at Awash. The best distinguishing characters are probably the greater amount of yellow in the dorsal pelage of *A. lacernatus*, especially marked on the rump, and the longer hind feet (22–23 mm in *A. somalicus*; about 30 mm in *A. lacernatus*).

The five available skins of *A. somalicus* from Awash are all of rather young animals, with the teeth scarcely worn, and therefore the other external measurements (head and body 93–106 mm; tail 88–105 mm) are probably below adult size. The ventral pelage of *A. somalicus* resembles that of *A. lacernatus* in being pale grey, rather sharply demarcated from the brown of the flanks.

Dasymys incomtus (Sundevall)—Shaggy rat

Bahar Dar: one trapped in wet grassland with scattered thickets.

Bahar Dar is close to the type locality of *D. i. griscifrons* Osgood, but this specimen does not show the grey forehead and face described for *griseifrons*. The only other examples of this species from Ethiopia in the British Museum are single specimens from Nono, upper Omo and Wodessa River, Guma. Delany & Neal (1963) also reported this species from damp habitats in Uganda ('swamps, reed beds and river valleys') and mentioned that it occurs above 4000 m on Ruwenzori.

Lemniscomys striatus (L.)—Striped mouse

Blue Nile Gorge: one 10 km east of Caroarsa River; four at mouth of Didessa River. These were all trapped in long grass on the bank of the river.

The only previous records of this species in Ethiopia appear to be from Nono, 150 km south of the Blue Nile (the type of *wroughtoni* Thomas), from the Urgessa River (an upper tributary of the Didessa River) and from Delbena River, Konso (?near Mega in the extreme south). The two skins from the Blue Nile have the normal yellowish brown ground colour with only the mid-dorsal stripe dark, closely resembling *L.s. massaicus* (Pagenstecher) of Kenya and the skin from Konso, and quite different from the adjacent *L.s. wroughtoni* which has all the dark stripes virtually black. The type and only available specimen of *wroughtoni* came from 3600 m; the single specimen from the Urgessa River, at 2300 m, is considerably less dark, in fact intermediate between *wroughtoni* and the normal specimens from the Blue Nile at the mouth of Didessa River at about 800 m.

The Blue Nile animals resemble the East African *L.s. massaicus* and differ from West African forms, e.g. *L.s. striatus*, in having the lateral white stripes very bold and continuous. They differ from most *L.s. massaicus* in having the second white stripes (away from the mid-dorsal line) very well marked whereas these stripes are very fragmentary in *massaicus*.

Lophuromys flavopunctatus Thomas—Harsh-furred rat

Bahar Dar: seven trapped in thickets in wet grassland.

Debra Markos: one trapped in low, grazed *Acacia* scrub.

Ghimbi: two adults and three nestlings.

Harar: two trapped amongst thorn scrub at Bisidima River.

Dessie: two from 18 km N.W. of Dessie at 2700 m, trapped on the edge of a marsh (from the Wellcome Parasitology Unit no. 2).

Addis Ababa: one from the British Embassy compound (from Wellcome Parasitology Unit no. 2); one from Meta Abo, Sabata, c. 20 km S.W. of Addis Ababa.

The specimens from Harar appear to differ from the series from the highlands only in the lighter and brighter orange-brown colour of the proximal zone of the dorsal hairs. These can probably all be attributed to *L.f. flavopunctatus*. The single skin from Addis Ababa differs from all the others in being more coarsely speckled above due to longer subterminal light bands on the hairs.

The locality at Harar, although close to the River Bisidima, is an unusually dry habitat for this species which is more characteristic of montane forest or moist scrub.

One female from Harar and that from Debra Markos were pregnant, each with five embryos.

Genus ***MUS***—Pygmy mice

Mus mahomet Rhoads

Debra Markos: two trapped in small thicket surrounded by grazed grassland.

Dessie: one from 18 km N.W. of Dessie at 2700 m on a steep rocky hillside grazed by goats; two from 31 km N.W. of Dessie at 2000 m (all from the Wellcome Parasitology Unit).

This is a rather distinctive species, apparently confined to Ethiopia and the adjacent part of Somalia. It is a fairly large grey-bellied form with yellow lines bordering the grey and a faint mid-ventral yellowish stripe.

Mus tenellus (Thomas)

Blue Nile Gorge: four from 10 km west of Mabil, trapped in dry scrub; one 10 km east of Caroarsa River, trapped amongst tall, wet grass.

Awash: two, probably of this species, in dry *Acacia* scrub close to riverine woodland.

The group of small, white-bellied *Mus* (or *Leggada*) badly needs revision. These have been compared with the type of *tenellus* (from Roseires on the Sudanese Blue Nile) and there seems little doubt that at least the Blue Nile animals can be allocated to that form.

Mus ?pasha (Thomas)

Blue Nile Gorge: eight from 10 km west of Mabil, trapped in grassland adjacent to permanent riverine vegetation.

These are white-bellied mice considerably larger than *M. tenellus*, with head and body length of 69–85 mm (49–65 mm in *M. tenellus*), hind feet of 14–15 mm (12–13 mm in *M. tenellus*), and upper molar row of 3·7 mm (two specimens; 3·1 and 3·0 mm in two *M. tenellus*). *Leggada pasha* was described from the Uele District, N.E. Congo but was treated by Osgood (1936) as a race of *Mus proconodon* Rhoads from Somalia. Setzer (1956) did not record either of these forms from the Sudan.

Genus ***PRAOMYS***—Soft-furred rats

Praomys albipes (Rüppell)

Debra Markos: one caught by hand in camp amongst low *Acacia* scrub.

Bahar Dar: two trapped in thickets in wet grassland.

Blue Nile Gorge: one caught on a boat, 30 km below Portuguese Bridge near Mota at 11° 12′N, 38° 05′E, altitude 1400 m.

Addis Ababa: nine from about 48 km west of Addis Ababa (from Wellcome Parasitology Unit).

Dessie: one from 31 km N.W. of Dessie (from Wellcome Parasitology Unit).

Lake Abbaya: eight from the Bonchi Valley, west of the lake at 2900 m.

This is a clearly defined species, formerly placed in the genus *Myomys*, confined to the Ethiopian Highlands except for an isolated and only doubtfully conspecific form, *P.a. fuscirostris*, in Sudan. These specimens, like all those recorded from Ethiopia, belong to *P.a. albipes*. All are from the plateau, between 1400 and 3000 m.

Praomys fumatus brockmani (Thomas)

Harar: one trapped in thorn scrub beside a dry river bed 60 km east of Harar on Jiggigga road.

This specimen agrees well with the type of *brockmani* from northern Somalia and is distinctly paler than *P.f. allisoni* Hayman from central Ethiopia. This species was recorded from the Harar area by Ingersol (1968).

Praomys (Mastomys) natalensis (Smith)

Blue Nile Gorge: one skull found at mouth of Guder River; one trapped in dry scrub 10 km west of Mabil; four trapped in long grass at the edge of riverine forest at the mouth of the Azir River; eleven from the mouth of the Didessa River, in long grass on the river bank and in maize cultivation near the village.

Bahar Dar: one trapped in thicket in wet grassland.

Ghimbi: one 24 km north of Ghimbi, in long grass.

Harar: two from Bisidima River, in dry, grazed thorn-scrub.

Awash: four from dry *Acacia* scrub; a few skulls from the lava caves.

Lake Abbaya: eight from the following localities. Bonchi Valley, west of lake, 2900 m; Collufo River, between Lake Abbaya and Lake Chamo; mouth of Darsi River.

Little Abbai: six collected.

Osgood (1936) recognized two species of '*Mastomys*' in Ethiopia, which he called *M. coucha lateralis* (Heuglin) and *M. macrolepis* (Sundevall). The latter he described as having a longer tail, shorter hind feet and paler ventral pelage, and recorded from the Blue Nile Gorge and Lake Tana (the type locality is Roseires on the Blue Nile in Sudan). Setzer (1956) listed *macrolepis* as a race of *M. natalensis* (*M. coucha*), although he recognized two sympatric species of *Mastomys* elsewhere in Sudan. In the present collection the animals from the Nile Gorge have the tail longer than the head and body (measured from the anus) with four exceptions out of 16 (mean 102·4% of head and body); those from Awash and Harar have the tail shorter than the head and body in five out of six animals (mean 94·7%). The Nile animals have the ventral pelage paler than the eastern ones, but there is no difference in length of hind foot: mean of 24·6 mm in the gorge, 24·5 mm in the eastern samples. The single skin from Bahar Dar on Lake Tana is dark-bellied with a short tail as in the eastern samples.

These are all tentatively referred to *P. natalensis*, but this group badly needs revision, especially in view of the demonstration of sibling species with very different chromosome complements elsewhere in Africa (Matthey, 1966).

Rattus rattus alexandrinus (Geoffroy)—House rat

Ghimbi: three collected in or around the town.

Harar: three from the Bisidima River.

Lake Abbaya: six from near Soddu.

These are called *R.r. alexandrinus* following the revision by Schwarz and Schwarz (1967) who treated *Mus samharensis* Heuglin (Ethiopia) and *Mus kijabius* Allen (Kenya) as synonyms.

Dendromus mystacalis Heuglin

Blue Nile Gorge: one from mouth of Guder River, caught by hand in the camp near steep rocky hillside with thick bush; one at mouth of Didessa River, caught by hand under bushes on a small island. Both were in the riverine forest strip.

This is a poorly known species in Ethiopia although it appears to have a wide distribution through much of Africa. These specimens have a very slight darkening in the mid-dorsal area but no black stripe, and a similar specimen is in the British Museum from 230 km south of Addis Ababa. Specimens from Dangila and Lake Tana on the other hand mostly have a clear dorsal stripe.

Otomys typus (Heuglin)

Debra Markos: one trapped by day in low, grazed *Acacia* scrub.

This specimen represents the nominate subspecies, described from the Simien Mountains.

Family **GLIRIDAE**—Dormice

Graphiurus murinus ?internus Dollman

Blue Nile Gorge: one at the mouth of the Fincha River, trapped in riverine forest, 45 cm off the ground in dry bushes.

There are very few previous records of *Graphiurus* from Ethiopia. These appear to be from Mt. Amar Cocche, Omo Valley, recorded as *Claviglis brockmani internus* by de Beaux (1943); Saganeita, Eritrea, recorded as probably *C. orobinus* by de Beaux; Guri Dagono and Sidamo, Arussi, recorded as *G.m. saturatus* by Hayman (1960); and Gara Mullata, Harar, recorded by Ingersol (1968) without allocation to subspecies. Only the skin from Guri Dagono has been available for comparison. The present specimen appears identical, but with respect to colour these specimens are much closer to the type of *G.m. internus* Dollman from northern Kenya than to the darker *G.m. saturatus* from Mount Elgon. The skull is, however, rather large (condylobasal length 23·3 mm as compared with 20·7 in the type of *internus*, a slightly older animal judging by the teeth).

This genus has never been adequately revised and the allocation of all named forms from northeastern Africa to *G. murinus* (type locality Cape of Good Hope) must be considered very tentative. A form described from Senaar on the Blue Nile in Sudan, *Myoxus orobinus* Wagner, 1845, may be relevant, but no further specimens have been reported from that region of Sudan and the original description is inadequate.

Family **RHIZOMYIDAE**—Mole-rats

Tachyoryctes splendens (Rüppell)

Dessie: one from 18 km N.W. of Dessie (from the Wellcome Parasitology Unit no. 2).

Addis Ababa: one from Meta Abo, Sabata, c. 20 km S.W. of Addis Ababa.

Lake Abbaya: two from the Bonchi Valley at 2900 m; one from Mount Gugi (2400 m); and three from Arba Minch.

These can probably all be referred to *T.s. splendens*, being rather smaller than *T.s. cheesmani* Thomas from Lake Tana.

Tachyoryctes macrocephalus hecki Neumann and Rümmler

Bale Mountains: one (skin and skull) from Dinshu (=Gurie), Ueb Valley, at 3500 m (from Mr J. H. Blower); a fragmentary skull from an eagle's nest 30 km south of Dinshu at 3800 m (sent by Mr L. H. Brown); a complete skull from Batu (6° 55'N, 39° 47'E, 4150 m) collected by Mr H. F. Mooney. Mr Blower (in litt.) also saw colonies of this species at 3800 and 4000 m in the same area, apparently confined to 'open moorland where the grass is very short, often in relatively damp places, sometimes near streams'.

This is a very large mole-rat, about twice the size of the common *T. splendens*. Both the nominate race (from Shoa) and *T.m. hecki* appear to be known only from the original specimens, namely three syntypes of *macrocephalus* (in Berlin, Frankfurt, and London) and the type of *hecki* in Berlin.

The type locality of *hecki* was given as 'Abakkara, etwa 150 km westlich des Abassi Sees in Grenzgebiet zwischen Djamdjam und Arussi Galla gelegen'. Assuming that 'Abassi See' is Lake Awusa, the 'westlich' would seem to be an error for 'ostlich'. This would place it not only between Djamdjam and Arussi but close to the locality of the records reported here.

The present specimens agree with the description of *hecki*, and differ from the London syntype of *macrocephalus*, in having the rostrum and upper incisors relatively small (Table 1). This difference is very marked and suggests that these might prove to be genuinely discrete subspecies or even species, perhaps isolated by altitude. Even in *T.m. macrocephalus* the incisors are relatively smaller than in the small *T. splendens*, suggesting a less fossorial habit, and this is supported by the sight records, the animals being described as marmot-like and frequently visible on the surface (J. H. Blower, in *litt.*).

There is an old record of '*Tachyoryctes macrocephalus*' from Kita in the upper part of the Senegal basin (now in Mali) (Rochebrune, 1883). It was described as 'plus commune . . . dans les environs de Kita, où elle habite les crevasses des rochers et les pentes sablonneuses des collines boisées; les Européens la désignent sous le nom de Marmotte'. It seems probable that this account really refers to the gundi, *Felovia vae* (Lataste), which was not otherwise mentioned by Rochebrune and was first discovered by Lataste in the Felou Hills, about 250 km northwest of Kita, and described by him in 1886.

Ignoring this probably erroneous record, *T. macrocephalus* is endemic to the Ethiopian plateau.

TABLE 1

Measurements of *Tachyoryctes macrocephalus*

	T. m. hecki				*T. m. macrocephalus*		
	BM 68.856	BM 70.746	Type of *hecki**	BM 71.876	BM 42.8.15.1	Senck. Mus. 728*	Berlin*
Length of head and body (from dry skin)	c. 400						
Length of hind feet	33				34		
Condylobasal length				64·0			
Width across premaxillae	11·2	12·2	c. 10·9	11·8	14·1		
Combined width of upper incisors (near tip)	7·1	7·0	7·2	7·0	9·5	8·6	9·5
Interorbital width	5·7	6·0	6·2	6·2		5·7	6·3
Length of nasals	29·6	30·2		28·3	27·9		
Upper molar row (alveolar)	12·0	11·8	13·0	12·1		12·0	12·2
Lower molar row (alveolar)	13·5		13·8	13·8	13·1	13·3	13·7
Length of mandible	43		c. 42	43	c. 45	43	

* From Neumann & Rümmler, 1928.

Family **THRYONOMYIDAE**—Cane rats

Thryonomys gregorianus (Thomas)

Blue Nile Gorge: one damaged skull from a cave 10 km W of Mabil; possible sightings at the Didessa River.

Wollega Province: one specimen from Bako in Addis Ababa Museum (skull and colour photo of mounted skin examined by G.B.C.).

Ilubabor Province: one skin from Gambela collected by Dr J. Ash in March 1969.

The Blue Nile specimen was on the surface of the floor of a cave covered with bat and hyrax guano and therefore must be very recent. These appear to be the first records of *Thryonomys* from Ethiopia, and in Sudan the only record of *T. gregorianus* is from the Didinga Mountains on the southern border. These skulls agree closely with the type of *gregorianus* (from central Kenya) and differ from the type of *harrisoni* Thomas & Wroughton from southern Sudan in having the nasals short and wide; the posterior processes of the premaxillae wide and rounded (in dorsal view); and the zygomatic parts of the lachrymals elongate. The skin from Gambela could conceivably be *T. harrisoni* if that is distinct. Both skins have the short tail (not extending beyond the hind feet when these are extended backwards) characteristic of *T. gregorianus* and *T. harrisoni* in contrast to the very much longer tail of *T. swinderianus*. The skin from Gambela is of a young animal with the following measurements: head and body 329; tail 73; hind feet 71; and ear 25 mm.

Setzer (1956) treated *T. gregorianus* and *T. harrisoni* as specifically distinct, recording both from southern Sudan. Misonne (1968) recognized only two species in

the genus, *T. swinderianus* and *T. gregorianus*, presumably treating *harrisoni* as conspecific with *gregorianus*, but in view of the cranial differences and the small numbers of specimens available it seems wise to treat them as provisionally distinct.

A subfossil *Thryonomys* from a mesolithic site at Khartoum, Sudan has been described as *T. arkelli* by Bate (1947, 1949). Bate considered it more closely related to the larger *T. swinderianus* than to *T. gregorianus* or *T. harrisoni* and a re-examination of the type supports this view. It differs from the types of *T. gregorianus* and *T. harrisoni* and from the Ethiopian specimens in its slightly larger size, prominent masseteric knob and robust anteroventral root of the zygomatic arch.

Family **HYSTRICIDAE**—Porcupines

Hystrix cristata L.—Crested porcupine

Lake Chamo: one from northeast of lake, in the 'White Grass' area.

Blue Nile Gorge: quills found at the Mugher, Guder, Fincha and Caroarsa Rivers.

Awash: quills found in the lava caves.

H. cristata is here considered to include the East African *galeata* (Corbet & Jones, 1965).

Order **CARNIVORA**

Family **CANIDAE**

Lycaon pictus (Temminck)—Hunting dog

Lake Abbaya: one shot near Soddu in 1964.

Canis aureus L.—Golden jackal

Luma, Didessa Basin: a skull received from Mr John Blower is probably of this species. The animal was shot in a cultivated clearing in bamboo forest at 9° 40′N, 35° 55′E, 2000 m.

Dangila: one shot between Dangila and Engiabara.

Little Abbai: two collected.

Otocyon megalotis (Desmarest)—Bat-eared fox

Harar: one from the Bisidima River; one from 60 km east of Harar on the Jiggigga road; eight others seen in this area.

Awash: a skull was found on the floor in one of the lava caves.

Family **MUSTELIDAE**

Ictonyx striatus (Perry)—Zorilla

Awash: one seen at night.

Addis Ababa: one dead on the main road south-east from Addis Ababa to Shashamane.

Family **VIVERRIDAE**

Genus ***GENETTA***—Genets

Genetta genetta (L.)

Harar: one from the Bisidima River; one from 60 km east of Harar on the Jiggigga road.

Genetta ?tigrina (Schreber)

Ghimbi: one from 24 km east of Ghimbi.
Lake Chamo: one from northwest of lake.
Lake Abbaya: one from Arba Minch, southwest of lake.
The three skins collected are very similar in colour and pattern. According to Coetzee (1967) the Ethiopian race is *G.t. schraderi* Matschie. The taxonomy of this group of genets is in a very provisional state. It is possible that the northern forms of the *tigrina* group, including *schraderi*, represent a separate species, *G. rubiginosa*. A third species of genet recorded from Ethiopia, but not represented in the present collections, is *G. abyssinica* (Rüppell) which Coetzee (1967) separated subgenerically from *G. genetta* and *G. tigrina*.

Ichneumia albicauda (G. Cuvier)—White-tailed mongoose

Bahar Dar: one collected.
Ghimbi: three collected.
Lake Abbaya: two from Arba Minch.
Lake Chamo: three from northwest of lake; two from 12 km south of Gardulla, south of the lake.
Blue Nile Gorge: one seen at Mabil.

Herpestes sanguineus Rüppell—Slender mongoose

Lake Chamo: one from west side of lake; one from northeast of lake.

Viverra civetta Schreber—Civet

Ghimbi: one from 10 km east of town.
Lake Abbaya: one from near Soddu; one from Arba Minch.

Family **HYAENIDAE**

Proteles cristatus (Sparrman)—Aardwolf

Awash: the remains of five animals were recovered from one of the lava caves, one as a complete skeleton and four skulls.
The aardwolf has a very wide distribution in Africa, but it is a very elusive animal and is seldom recorded. Ingersol (1968) reported it from the Afden Plain just east of the Awash and at Amarresa in the Harar district.

Crocuta crocuta Erxleben—Spotted hyaena

Harar: about 15 hand-fed by the 'hyaena man' at dusk outside the city.
Ghimbi: one dead on the main road east of the town.
Debra Markos: up to six seen around the town.

Family **FELIDAE**

Felis silvestris libyca Forster—Wild cat

Harar: one from the Bisidima River.
Bahar Dar: one collected.
Blue Nile Gorge: one from Shafartak.

Felis serval Schreber—Serval

Degen, Gojjam: one collected.
Ghimbi: one collected.
Little Abbai: two collected.
These all have the ground colour of the pelage yellowish as in *F. s. hindei* Wroughton from Kenya which they closely resemble, and are not nearly so pale as in the type of *F.s. tanae* (Pocock, 1944) from Lake Tana.

Panthera pardus (L.)—Leopard

Blue Nile Gorge: one seen beside the river, between Shafartak and the Mugher; traces near the Caroarsa River.
Awash: two seen.

Panthera leo (L.)—Lion

Awash: two seen hunting together.
Blue Nile Gorge: unconfirmed report of a party near the mouth of the Guder River.

Order HYRACOIDEA

Procavia habessinica (Hemprich & Ehrenberg)—Large-toothed rock hyrax

Harar: two from Valley of the Rocks, 40 km east of Harar; two from 60 km east of Harar (all *P.h. erlangeri* Neumann).
Lake Langano: two from west side of lake (*P.h. alpini* (Gray)).
These two groups are so different in appearance that their conspecificity must be considered doubtful. The *P.h. erlangeri* agree closely with a series in the British Museum from Dire Dawa, about 50 km N.W. of Harar, and specimens were recorded from Harar by Neumann. These all have the head black with a rufous tinge, the dorsal pelage mottled yellow and black and the dorsal glandular spot scarcely visible. A very young animal (head and body 260 mm) has the head equally black but there is less yellow in the rest of the dorsal pelage.

The skins of *P.h. alpini* have the head much lighter, the dorsal pelage greyish brown and finely speckled, and the glandular streak prominently yellow. The yellow glandular streak distinguishes this form from *P.h. habessinica* from N.E. Ethiopia and from *P.h. scioana* (Giglioli), a very dark form from Ankober, Shoa, as well as from *P.h. erlangeri*.

In view of the many problems remaining to be solved in this genus it seems premature to assume these to be conspecific with the South African *P. capensis* as suggested by Ellerman & Morrison-Scott (1951).

Heterohyrax brucei brucei (Gray)—Small-toothed rock hyrax

Harar: two from 60 km east of Harar, at precisely the same locality as the *Procavia habessinica*.

Blue Nile Gorge: mandibles found at mouth of Guder River.

Lake Abbaya: two from Arba Minch; two from Arba Mondi, south of lake.

The specimens from Harar agree closely with the type of *brucei*. The form *hararensis* Brauer from near Harar was listed by Allen (1939) as a synonym of *somalica* Thomas from N. Somalia, described as smaller and paler than the type of *brucei*. It is unlikely that *somalica* will prove a valid subspecies, but in any case the specimens from Harar seem closer to *brucei* than to *somalica*. *H.b. hararensis* was diagnosed as smaller than *brucei* and distinguished from both *brucei* and *somalica* by greyish white ventral pelage. In fact the present specimens have quite dark yellowish buff undersides, one of them with an irregular pure white area of the chest and in front of the genitalia. The dorsal glandular streak is bright yellowish brown.

The specimens from Lake Abbaya in the Rift Valley are scarcely distinguishable from those from Harar.

Order TUBULIDENTATA

Orycteropus afer (Pallas)—Aardvark

Debra Markos: burrows seen.

Awash: one killed by a car on the track in the park.

Order PERISSODACTYLA

Family **EQUIDAE**

Equus burchelli boehmi Matschie—Common zebra

Lake Chamo: up to 96 counted in the 'White Grass' area.

Order ARTIODACTYLA

Family **HIPPOPOTAMIDAE**

Hippopotamus amphibius L.—Hippopotamus

Blue Nile Gorge: seen from the Fincha River westwards, including Wamet Ford (4), Azir to Caroarsa (12), Didessa (tracks, and several heard at night). Heard also

in the vicinity of Tississiat Falls. A skull found at the mouth of the Azir River was preserved.

Awash: one seen on several occasions.

Lake Abbaya: two skulls were found and preserved.

Family **SUIDAE**

Phacochoerus aethiopicus (Pallas)—Wart hog

Lake Abbaya: six collected, two near Soddu and four from near Arba Minch.

Lake Chamo: group of nine seen in the 'White Grass' area.

Awash: two family parties of 4+ seen; a skull was found in one of the lava caves.

Potamochoerus porcus (L.)—Bush pig

Lake Abbaya: one from south of the lake.

Family **BOVIDAE**

Madoqua phillipsi hararensis Neamann—Phillip's dik-dik

Harar: three from 60 km east of Harar on the Jiggigga road.

Awash: numerous sight records, each of one or two animals only.

Madoqua guentheri Thomas—Günther's dik-dik

Lake Chamo: four from the 'White Grass' area.

Sylvicapra grimmia (L.)—Common duiker

Bahar Dar: one collected, and several others seen.

Little Abbai: two collected.

Lake Abbaya: one from near Soddu.

Sire, Wollega: skull preserved of a female killed on the main road from Ghimbi to Addis Ababa, between the towns of Sire and Bako at 9° 08'N, 37° 05'E.

Ourebia ourebi (Zimmerman)—Oribi

Blue Nile Gorge: four seen at night on the air-strip at Sirba.

Oreotragus oreotragus (Zimmerman)—Klipspringer

Blue Nile Gorge: two seen between the Guder and Fincha Rivers and two between the Fincha River and Wamet Ford.

Harar: two seen in the Valley of the Rocks.

Kobus defassa (Rüppell)—Waterbuck

Awash: several, including a party of four.

Lake Chamo: a herd of 16 in the 'White Grass' area.

Alcelaphus buselaphus swaynei (Sclater)—Common hartebeest

Lake Chamo: up to 104 counted in the 'White Grass' area.
This subspecies is considered to be extinct in Somalia, and perhaps only 200 exist in Ethiopia (Simon, 1968).

Tragelaphus scriptus (Pallas)—Bushbuck

Ghimbi: two from 16 and 20 km east of Ghimbi.
Lake Abbaya: two from Arba Minch.
Blue Nile Gorge: one seen at Mabil.
Bahar Dar: one seen.
Awash: one seen.

Tragelaphus imberbis Blyth—Lesser kudu

Awash: seen in small numbers.

Tragelaphus strepsiceros (Pallas)—Greater kudu

Lake Chamo: two from between Lake Chamo and Lake Abbaya.
Lake Abbaya: one from Borodda, N.W. of lake.
Awash: up to 14 seen.

Litocranius walleri (Brooke)—Gerenuk

Awash: three seen.

Gazella soemmerringi (Cretzschmar)—Soemmerring's gazelle

Awash: large numbers seen, in groups of 50–100. One was collected and a skull was retrieved from one of the lava caves.
The specimen collected resembles the Somalian race, *G.s. berberana* Matschie, 1893, in its horn shape and extensive dark nose spot, and the Awash animals can probably be attributed to that race. This specimen does not agree well with Matschie's (1912) description of *G.s. erlangeri* from Awash.

Gazella granti Brooke—Grant's gazelle

Lake Chamo: two collected in the 'White Grass' area and 46 counted on one occasion.

Oryx gazella beisa (Rüppell)—Oryx

Awash: large numbers seen, including one herd of 150. Parts of two skulls were retrieved from the lava caves.

DISCUSSION

Zoogeographically, the fauna of Ethiopia (usually termed, to avoid confusion, the Abyssinian fauna) is noted for its peculiar caste. While much of the fauna is of a general East African type, including species with a wide distribution even down to the Cape Province, there is also a small proportion of species of Palaearctic affinities and a significant roster of endemic species as well. Moreau (1966) for the birds and Carcasson (1964) for the butterflies have commented on these peculiarities of the Abyssinian fauna when seen from the viewpoint of continental zoogeography, while Carpenter (1935), approaching the subject from a study of the Abyssinian butterfly fauna particularly, and including also relevant information from other groups, has discussed the different taxa.

The conspicuous endemicity undoubtedly results from the large area of high plateau included in Ethiopia and its isolation from neighbouring mountain areas—both Moreau and Carcasson note that two habitat types, montane woodland and montane grassland, contain most of the endemics in the groups they studied. The interplay of a variable Pleistocene climate and this montane area is presumably responsible for the Palaearctic element reaching Ethiopia—during glacial (pluvial) periods, montane habitats would have occurred at lower altitudes, and would have spread up the mountains along the Red Sea coast of the Sudan and Nubia. This spread of montane habitat in the glacial periods would also account for another peculiar zoogeographical relationship of some Abyssinian fauna, that element which is of general montane type and may as a result have affinities with the fauna of the Cameroon Highlands of West Africa.

Any zoogeographical analysis of the mammalian fauna has hitherto been mainly confined to the larger mammals—see for example Blower (1968), Scott (1958) and Glass (1965)—and can be usefully illustrated by the maps showing the range of individual species throughout Africa in Dorst & Dandelot (1970). In the following analysis the smaller mammals are also considered, although many taxonomic problems remain to be solved before this can be quantified precisely at the levels of the species and subspecies.

The East African savanna and steppe element

This is the dominant element in southern and western Ethiopia, in the Rift Valley and in the valley of the Blue Nile. Many of the species concerned have wide distributions throughout the savanna zone from West Africa to Tanzania and further south, e.g. the giraffe *Giraffa camelopardalis*, the hartebeest *Alcelaphus buselaphus* and the striped mouse *Lemniscomys striatus*. Species of this group vary in the extent to which they penetrate Ethiopia. *L. striatus* occurs in the valley of the Blue Nile and its tributaries but does not appear to occur in the Rift Valley. *A. buselaphus* on the other hand extends through the Rift Valley to the Awash Valley. Grant's gazelle *Gazella granti* shows another pattern in that it reaches from Kenya into the southern part of the Rift Valley but is replaced by a related species, *G. soemmerringi*, in the northern part of the rift.

Small mammals falling into this general group, all reaching their north-eastern

limit in Ethiopia, are *Graphiurus murinus*, *Praomys fumatus*, *Elephantulus rufescens* and *Galago senegalensis*. Species with a similar range, but also reaching north of Ethiopia, are *Acomys* spp., *Arvicanthis niloticus*, *Hystrix cristatus*, *Lepus capensis*, *Crocidura flavescens* s.l. and *Felis silvestris*.

The Somalian arid zone element

Somalia is an area with a considerable degree of endemicity amongst the dry steppe fauna, and some of these species reach into eastern Ethiopia. The most sharply differentiated (endemic genera) are the gundi, *Pectinator spekei*, the naked mole-rat, *Heterocephalus glaber*, which reaches west as far as Shoa, the dibatag, *Ammodorcas clarkei*, which just reaches eastern Ethiopia, the beira, *Dorcatragus megalotis*, and the gerbil *Microdillus peeli*, the last two unrecorded from Ethiopia. Another group comprises species that are more closely related to widely distributed savanna or steppe species, e.g. *Gazella soemmerringi* which has a wide range, reaching round the northern edge of the Ethiopian highlands to the Sudan, the dik-dik *Madoqua phillipsi* and the grass-mouse *Arvicanthis somalicus* here recorded from Awash. Comparable Somalian species that do not appear to have been recorded in Ethiopia are the elephant shrew *Elephantulus revoili* and the hedgehog *Erinaceus sclateri*.

The Palaearctic element

This is a very small element in the mammalian fauna comprising the ibex, with *Capra ibex nubiana* in the Red Sea Hills and a southern isolate, *C.i. walie*, in the Simien Mountains; the wild ass *Equus africanus* in the Danikil Desert; and the shrew *Suncus etruscus*, here reported from the plateau but in its Mediterranean range a species of the drier lowlands. It is probable that the hedgehog *Paraechinus aethiopicus*, a species with a Saharan and Arabian distribution, is also present in northern Ethiopia. All these are tolerant of dry conditions. The ass probably had a continuous range from North Africa to Somalia in recent times, but the ranges of the ibex and the shrew are of a relict character, the latter showing a considerable degree of disjunction although it is an easily overlooked species and may still be found in intervening regions.

Among the birds of Ethiopia, the most notable Palaearctic immigré is the chough *Pyrrhocorax pyrrhocorax*, while the endemic owl *Asio abyssinicus* is considered a close relative of the northern *A. otus*; other Palaearctic birds listed by Moreau (1966) include the grebes *Podiceps caspicus* and *P. ruficollis*, the lammergeier, *Gypaetus barbatus*, Alpine swift, *Apus melba*, and quail *Coturnix coturnix*, which occur also into Kenya. Among the butterflies Carcasson (1964) and Carpenter (1935) list seven or eight species of Palaearctic affinity, including the endemic 'speckled wood', *Pararge madarakal*, and *Pieris brassicoides*, found also in Tanganyika.

The East African montane element

In spite of the very great distances separating the montane forest and grassland habitats of Ethiopia from comparable habitats further south, e.g. in the Kenya

highlands and Mount Elgon, there are several forms showing very little differentiation between these segments of their ranges. Examples amongst the rodents are *Lophuromys flavopunctatus*, *Lophiomys imhausi*, *Otomys jacksoni* and *Tachyoryctes splendens*. Some of these species, however, have moderately wide ecological requirements, e.g. *L. flavopunctatus* which is here recorded from seasonally dry habitats near Harar although it is more strictly confined to forest farther south. A lesser known rodent with a highly disjoint distribution is *Colomys goslingi*, known from swampy habitats in Cameroon, N.E. Congo, Kenya and the Ethiopian plateau where it is known from a single specimen previously believed to represent an endemic genus *Nilopegamys* (see Hayman, 1966). The mountain reedbuck, *Redunca fulvorufula*, also has a highly disjunct range with isolates in S. Africa and perhaps in Cameroon, but it is tolerant of fairly dry habitats.

Amongst the birds and butterflies there are likewise a number of species with strikingly disjunct distributions in various montane areas in East Africa, and across in some cases to the Cameroon Mountains and in others as far as Cape Province. The weaver *Cryptospiza salvadori*, for example, occurs in isolated patches of Ethiopia, Uganda, Kenya and Tanzania, while the babbler *Alcippe abyssinicus* occurs in these areas and in the Cameroons as well (Moreau, 1966). Carpenter (1935) listed about ten butterflies with similar distributions.

The endemic element

Endemic Ethiopian species are confined to the highlands and especially to the high montane grasslands which have presumably had the longest period of isolation and until recent deforestation were presumably much more sharply isolated from any comparable lowland habitats than they are today. The species concerned are the gelada baboon, *Theropithecus gelada*, the Simien fox, *Canis simensis*, the mountain nyala, *Tragelaphus buxtoni*, the genet *Genetta abyssinica*, the giant mole-rat *Tachyoryctes macrocephalus*, and the murid rodents *Stenocephalemys albocaudata*, *Muriculus imberbis*, *Dendromus lovati*, *Praomys albipes*, and *Pelomys dembeensis*. All these are well defined species, and three are currently considered endemic genera, namely *Theropithecus*, *Stenocephalemys* and *Muriculus*. It is possible that further endemic species occur in the genera *Crocidura*, *Procavia*, *Lophuromys*, *Arvicanthis*, *Praomys*, *Mus* and *Pelomys*, but further revision is needed to clarify their relationships with neighbouring forms.

All of these endemics belong to African rather than to Palaearctic groups, and all have their closest relatives in Ethiopia or in adjacent parts of East Africa. There are probably about 135 species of mammals in Ethiopia (excluding bats and marine species) and the eleven clear-cut endemics listed above therefore represent about 8·5% of the fauna, a figure that is likely to increase somewhat with further revision. Of the estimated 124 non-endemic species, about 16 are montane species whose Ethiopian populations are widely isolated from the rest of the range whilst the remainder, the great majority, are the more xerophilous species with ranges extending relatively unbroken into surrounding territories.

Carcasson (1964) listed at least 8 endemic butterflies (*Pararge maderakal*, *Papilio*

aethiops, Mylothris mortone, Bicyclus aethiops, Charaxes phoebus, Acraea oscari, A. ungemachi, A. safie) while Carpenter (1935) listed in all about 526 species from above 1500 m in Ethiopia; neither of these figures are complete, but they suggest an endemicity in the fauna of perhaps 2%. Among the endemic birds, Moreau (1966) mentioned the owl *Asio abyssinicus*, blue-winged goose *Cyanochen cyanopterus*, a swallow *Hirundo megaensis*, and the crow *Zavattariornis stresemanni*. In all, he suggested that there are 3 montane-forest and 21 montane non-forest endemic birds, while Urban & Brown (1971) listed 23 endemics in a total avian (breeding) fauna of 655 species. This would suggest an endemicity of about 3·5%.

Summary of Zoogeographical Affinities

It is clear from what little information has been presented above that the mammal fauna of Ethiopia shares with the better known bird and butterfly faunas the zoogeographical peculiarities of a conspicuous endemic element, a Palaearctic element, and also an element of discontinuously distributed montane animals. There is a suggestion that among the mammals the endemic element is greater and the other two elements fewer, and it is tempting to speculate on the role of relative mobility of the mammals as against the birds and butterflies. Unfortunately the mammalian faunas of both Ethiopia and other areas of importance are not sufficiently well known to be categorical about this—it may be relevant to note here that this paper records four species new to Ethiopia (*Crocidura niobe, Suncus etruscus, Thryonomys gregorianus* and *Arvicanthis somalicus*) and records several others that have been previously noted fewer than six times (*Tachyoryctes macrocephalus, Taterillus emini, Lemniscomys striatus, Praomys fumatus, Proteles cristatus*).

Fauna of the Blue Nile Gorge

Since the main object of the 1968 expedition was to carry out a scientific survey in the gorge of the Blue Nile, some concluding comments on the small mammals obtained there are justified. One point that was very evident in the field was the scarcity of small mammals—over nine hundred trap-nights were required to obtain 52 small mammals, or 17 trap-nights per specimen (for comparison, at Awash, about 5 trap-nights per animal, and at Bahar Dar 15 per animal, were required). From the species caught, it is evident that the small mammal fauna of the gorge is comparable with that found at Awash and east of Harar; among the species or genera common to both are *Crocidura ?sericea, Acomys dimidiatus, Heterohyrax brucei, Procavia habessinica* (on sight records only from the Blue Nile Gorge), *Tatera* sp. (*T. valida* in the Gorge, *T. robusta* in the East), *Mus tenellus*, and *Oreotragus oreotragus*.

By contrast, the collecting localities on the plateau (Ghimbi, Bahar Dar, Debra Markos) have in common *Lophuromys flavopunctatus*, and *Praomys albipes* was found at the two more northern of these. The presence in the Blue Nile Gorge of *Tatera valida, Lemniscomys striatus, Mus ?pasha* and *Acomys* spp. implies perhaps the incursion of an East African savanna element. While for human travel the Blue Nile Gorge represents a considerable barrier, so far as small mammals are concerned

it would seem rather to be a highway allowing dry-country, lowland species to penetrate deeply into the centre of Ethiopia.

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GAZETTEER

			Altitude (metres)	Dates of collecting
Abiu, Ilubabor	8°11′N	35°22′E	1500	January 1971
Addis Ababa, Shoa	9°00′N	38°45′E	2300	
Addis Alem, Shoa	9°03′N	38°25′E	2400	
Arba Minch, Gemu Gofa	6°04′N	37°40′E	1300	6 August–3 September 1966
Awash, Shoa	8°50′N	40°01′E	950	23–28 September 1968
Awash (lava caves), Shoa	8°56′N	39°57′E	950	28 September 1968
Azir River (mouth of)	10°29′N	36°25′E	800	20–22 August 1968
Bahar Dar, Gojjam	11°35′N	37°25′E	1830	11–14 September 1968
Bako, Wollega	9°08′N	37°05′E	1800	
Bisidima River, Harar	9°15′N	42°12′E	1500	20–21 September 1968
Bonchie Valley, Gemu Gofa	6°05′N	37°20′E	2700	1966
Caroasa River (near mouth)	10°07′N	36°12′E	600	23–24 August 1968
Collufu River (mouth), Gemu Gofa	6°04′N	37°40′E	1300	6 August–3 September 1966
Danghila, Gojjam	11°15′N	36°55′E	2000	
Darsi River, Gemu Gofa	6°15′N	37°50′E	1300	
Debra Libanos, Shoa	9°45′N	38°50′E	2300	
Debra Markos, Gojjam	10°20′N	37°50′E	2500	4–27 August 1968
Degen, Gojjam	10°10′N	38°05′E	2500	
Dessie, Welo	10°08′N	39°43′E	2700	
Didessa River (mouth of)	10°05′N	35°38′E	450	26–29 August 1968
Dim River (mouth of)	10°30′N	36°26′E	800	22 August 1968
Engiabara, Gojjam	10°58′N	36°58′E	2500	
Fantalle (Mt), Shoa	8°58′N	39°54′E	2000	
Filhoa, Awash, Shoa	9°00′N	39°58′E	1000	23–28 September 1968
Fincha River (mouth of)	10°03′N	37°20′E	1000	11–13 September 1968
Gambela, Ilubabor	8°15′N	34°35′E	600	
Ghimbi, Wollega	9°10′N	35°50′E	2150	22–31 August 1968
Guder River (mouth of)	9°50′N	37°41′E	1000	8–11 August 1968
Gughe (Mt), Gemu Gofa	6°05′N	37°20′E	2700	
Harar, Harar	9°20′N	42°08′E	2000	
Jiggigga Road (60 km E. of Harar)	9°14′N	42°32′E	1200	21–22 September 1968

Lake Abbaya, Gemu Gofa (S.W., near Arba Minch)	6°04′N	37°45′E	1300	6 August–3 September 1966
Lake Abbaya, Gemu Gofa (N.W., near Soddu)	6°40′N	38°00′E	1500	8–23 August 1964
Lake Chamo, Gemu Gofa (White Grasses)	5°58′N	37°55′E	1500	1966
Little Abbai, Gojjam	11°20′N	37°00′E	2000	27 August–5 September 1964
Mabil, Gojjam	10°19′N	36°45′E	900	14–20 August 1968
Mota, Gojjam	11°05′N	37°54′E	2500	
Metahara, Shoa	8°53′N	39°55′E	1000	
Mugher River (mouth of)	9°50′N	37°55′E	1000	8 August 1968
Nono, Upper Omo	8°30′N	37°21′E	1600	
Sabeta, Shoa	8°55′N	38°40′E	2500	
Shafartak	10°06′N	38°17′E	1150	
Sirba, Wollega	10°50′N	35°30′E	400	29–30 August 1968
Sire, Wollega	9°03′N	36°54′E	1800	
Soddu, Sidamo	6°45′N	37°50′E	1800	
Tississiat Falls	11°30′N	37°37′E	1800	
Valley of the Rocks, Harar	9°15′N	42°20′E	1300	21 September 1968
Wamet Ford	10°09′N	37°12′E	1000	20 August 1968

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